CHAPTER 5. RECESSES FOR UNWATERING BULKHEADS

5-1. General. To allow for service and repair to a valve without taking the lock out of operation, bulkhead recesses are provided on the high- and low-head sides of each of the four valves. Each recess consists of slots in the sides of the culvert, an opening in the culvert roof, and a shaft extending to the top of the lock wall. Although it is unlikely that more than one valve will be under repair at a given time, two sets of bulkheads normally are provided at each project to block upper and lower pools from the culvert system for unwatering of the lock. For storage, the bulkheads usually are held near the top of the shafts by dogging devices.

5-2. Bulkhead Recesses. Open-well bulkhead recesses on the high-head sides of the four valves have caused no problems during filling and emptying of the lock. However, there is one known case of a surge in the bulkhead recess created by operation, as discussed in paragraph 3-3c, lifting the bulkhead off of the dogging devices and then allowing it to slam down with sufficient force to break the dogging devices and drop into the culvert. The lifting force was due primarily to the stored bulkhead restricting flow up the shaft. It is suggested that the shaft be enlarged (see fig. 1-1) at the position of the stored bulkhead.

5-3. Location of Bulkhead Recesses. During the valve opening period, a zone of low and unstable pressures extends about 6-1/2 times the culvert height downstream from the valve. Usually, other considerations make it desirable to locate the bulkhead recess for the low-head side of the valve within this zone. Thus, an open well for the bulkhead recess on the low-head side of the valve would be a potential source for excess air entering the culvert system. Except for recesses on the low-head side of emptying valves discharging outside of the lower approach to the lock (see paragraphs 2-5a and b), the bulkhead recess on the low-head side of each valve should be sealed. Further, it is desirable that this seal be placed just above the level of the lower pool. If placed near the top of the lock wall, oscillations develop in the column of water in the bulkhead shaft and at some valve opening these oscillations interplay with and amplify the oscillations in the recess, causing unstable loads on the valve hoist.